

EXHIBIT 7

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

In re Global Brokerage, Inc. f/k/a FXCM Inc.
Securities Litigation

Master File No. 1: 17-cv-00916
(RA)(BCM)

This Document Relates To: All Actions

REBUTTAL REPORT ON MARKET EFFICIENCY
BY DR. ADAM WERNER

July 27, 2020

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I. INTRODUCTION

1. In my report dated January 10, 2020 (“January Report” or “Werner Report”), I examined factors that are generally accepted by courts as indicative of efficiency of the market in which a security trades. Based on my analysis of the factors, I concluded that the common stock of Global Brokerage, Inc., f/k/a FXCM Inc. (“FXCM” or the “Company”) traded in an efficient market during the period from March 15, 2012 through February 6, 2017 (the “Class Period”). I further concluded that FXCM’s 2.25% Convertible Senior Notes due 2018 traded in an efficient market during the period from June 24, 2014 through February 6, 2017 (the “Notes Period”).
2. In my January Report, I showed that each of the *Cammer* and *Krogman* factors supports a finding that the FXCM securities traded in efficient markets throughout the Class Period or the Notes Period. I further demonstrated, through event study analyses, that the FXCM securities reacted promptly to new Company-specific information as it entered the market. Reacting promptly to new material information is indicative of efficiency of the markets in which the securities traded.
3. In addition, I explained that a common damages methodology, consistent with Plaintiffs’ theory of liability, can be applied to compute damages for all investors who purchased FXCM securities during the Class Period or the Notes Period, and I described that methodology.
4. Subsequently, I was asked by Counsel for the Plaintiffs, The Rosen Law Firm, to consider and evaluate the arguments and conclusions in the Expert Report Of Terrence Hendershott, Ph.D., dated June 12, 2020 (“Hendershott Report”). I also reviewed the transcript of the Videotaped Deposition Via Zoom of Terrence Hendershott, recorded on July 15, 2020 (“Hendershott Deposition”).
5. The documents I reviewed and relied upon in the course of this engagement that are in addition to those cited in my January Report are listed in Exhibit-2. My credentials and compensation are presented in my January Report. My full Vitae including testimony that I have provided since my January Report is attached as Exhibit-1 to this report.
6. I understand that as an expert witness in this proceeding my duty in providing my report is to the Court and that this duty overrides any obligation to the parties who have engaged me,

from whom I have received instructions or compensation. I confirm that I have complied with this duty.

II. CONCLUSIONS

(i) Dr. Hendershott does not contest that the FXCM common stock traded in an efficient market during the Class Period. Dr. Hendershott raises no challenges to any of the analyses and conclusions in the Werner Report with respect to my market efficiency study for FXCM common stock.

(ii) The Hendershott Report offers me no reasons to change my opinion that the FXCM Notes traded in an efficient market. Dr. Hendershott's criticism of my market efficiency conclusion for the FXCM Notes stems from his flawed characterization and misunderstanding of my analyses.

(iii) The Hendershott Report offers me no reasons to change my opinion that damages can be calculated on a class-wide basis that is common to all class members and consistent with Plaintiffs' theory of liability.

III. CRITIQUE OF THE HENDERSHOTT REPORT

7. Dr. Hendershott does not address or contest my conclusion that the market for FXCM common stock was efficient throughout the Class Period.¹ As such, the Hendershott Report provides no reason for me to change my opinion that the FXCM common stock traded in an efficient market.
8. Indeed, Dr. Hendershott points to my discussion of market efficiency of the FXCM common stock to argue that my analyses of the Notes were insufficient to demonstrate market efficiency.² Dr. Hendershott further admitted during his deposition that he has no opinion on whether the FXCM Notes traded in an efficient market.

Q. Alright. Well, so putting aside your views of Professor Werner's report for a minute, is it fair to say that you do not have an independent opinion whether the notes traded in an efficient market or an inefficient market?

A. So, I did not reach a summary opinion on whether or not the market is efficient or inefficient.³

¹ See also, Hendershott Deposition, at 12:17-13:15.

² See, for example, Hendershott Report, ¶7, ¶44, and ¶53.

³ Hendershott Deposition, at 17:21-18:4.

9. In the Hendershott Report, Dr. Hendershott was asked to: i) “evaluate whether Dr. Werner’s analysis reliably demonstrates that the FXCM 2.25% Convertible Senior Notes due 2018 (the ‘FXCM Notes’) traded in an efficient market between June 24, 2014 and February 6, 2017”;⁴ and, ii) “evaluate whether the purported damages methodology described by Dr. Werner can be used to calculate damages in this matter for both FXCM’s common stock and the FXCM Notes on a class-wide basis in a manner consistent with Plaintiffs’ theory of liability.”⁵
10. Toward these ends, Dr. Hendershott concludes that “the Werner Report does not provide reliable evidence showing that the FXCM Notes traded in an efficient market throughout the Putative Notes Class Period”⁶ and that “Dr. Werner fails to show that the generic damages approach described in his report, including his generic reference to an event study, could be used to calculate damages in a manner consistent with Plaintiffs’ theory of liability.”⁷
11. Dr. Hendershott’s critiques of my market efficiency analysis for the FXCM Notes stems from an inappropriate application of common stock thresholds for assessing the *Cammer* and *Krogman* factors to the FXCM Notes. That bond markets and stock markets are fundamentally different is understood in academic literature and noted by legal authorities.⁸ Due to these differences, both the literature and legal authorities recognize that the question of efficiency should be assessed differently for each type of market. Simply noting that the FXCM Notes did not overwhelmingly satisfy certain *Cammer* and *Krogman* criteria – criteria which were developed solely with common stock in mind – as Dr. Hendershott has done, does not disprove that the FXCM Notes traded in an efficient market.

⁴ Hendershott Report, ¶7.

⁵ Hendershott Report, ¶7.

⁶ Hendershott Report, ¶11.

⁷ Hendershott Report, ¶14.

⁸ See, for example, “The Informational Efficiency of the Corporate Bond Market: An Intraday Analysis,” by Edith Hotchkiss and Tavy Ronen, *The Review of Financial Studies*, Vol. 15, No. 5, 2002, p. 1325; “The Timeliness of the Bond Market Reaction to Bad Earnings News*,” by Mark Defond and Jieyinh Zhang, *Contemporary Accounting Research*, Vol. 31, No. 3, 2014, pp. 919-920; and “Efficient Capital Markets: A Review of Theory and Empirical Work,” by Eugene Fama, *Journal of Finance* 25 (2), 1970, pp. 383-417; *In re HealthSouth Corporation Stockholder Litigation*, 30 September 2009; and *In re Petrobras Securities*, Case No. 16-1914, United States Court of Appeals, Second Circuit, filed July 7, 2017.

12. Nonetheless, Dr. Hendershott either acknowledges or does not dispute my findings regarding the following facts for the FXCM Notes:
- a. **Turnover** – Dr. Hendershott acknowledges that “Dr. Werner finds average weekly trading volume (*Cammer* Factor No. 1) to be 2.92% when measured over the entire two-and-a-half year period from June 27, 2014 to February 6, 2017.”⁹ Dr. Hendershott takes no issue with my calculation, nor does he contest that an average weekly trading volume of 2.92% for the FXCM notes satisfies *Cammer* factor 1.
 - b. **Analyst coverage** – Dr. Hendershott does not contest that “[d]uring the Notes Period, at least nine firms/analysts following FXCM issued recommendations and/or research reports.”¹⁰
 - c. **Market Makers (Or Underwriters)** – Dr. Hendershott does not contest that “Barclays, Sandler O’Neill, and UBS published reports stating that they made a market in FXCM securities during the Class Period,”¹¹ nor does he contest that ““according to the trades reported to TRACE, between 35% and 40% of the trades reported were dealer transactions.””¹²
 - d. **S-3 Eligibility** – Dr. Hendershott makes no comment regarding my finding that FXCM was eligible to file an S-3 registration statement during the Class Period, which includes the Notes Period, and that S-3 registration eligibility is indicative of market efficiency since the filing requirement ensured that financial data were available to market participants, and the “public float” requirement indicated that many market participants would have examined the information.¹³

⁹ Hendershott Report, ¶34.

¹⁰ Werner Report, ¶128.

¹¹ Hendershott Report, ¶57.

¹² Hendershott Report, ¶58.

¹³ Werner Report, ¶40 and ¶136.

- e. **Empirical Demonstration** – Dr. Hendershott acknowledges that the FXCM Notes exhibited statistically significant price reactions on January 16, 2015 and February 7, 2017, which demonstrates a cause and effect relationship between the release of new information, and price movements of the FXCM Notes.¹⁴
 - f. **Outstanding Par Value (Market Capitalization)** – Dr. Hendershott does not contest that “The aggregate par value of the FXCM notes totaled \$173 million and was larger than the market capitalizations of at least 40% of all public companies listed on the NYSE, AMEX, NASDAQ, and ARCA” during the Notes Period.¹⁵
 - g. **Float** – Dr. Hendershott does not contest that “the float of the FXCM notes equaled the amount outstanding” and that “[j]ust as the outstanding par value was large, so too was the float.”¹⁶
13. Dr. Hendershott does not challenge any of the above facts with respect to the *Cammer* and *Krogman* factors that I analyzed for the FXCM Notes. Moreover, during his deposition, Dr. Hendershott acknowledged that he does not dispute the following findings:

Q. Do you agree that the average weekly volume as stated by Dr. Werner is 2.92 percent, or do you contest that number?

A. I don't believe I contested that number.¹⁷

Q. Are you contesting that -- well, are you contesting that there were not, at least, nine firms or analysts following FXCM?

A. So it depends upon, I guess, what you mean by during the notes period. So I don't believe I'm contesting that there were nine follow -- that if you look at the entire notes period as a whole, that there were nine analysts who followed it over the two and a half year period.¹⁸

Q. Do you agree that FXCM was S3 eligible?

¹⁴ Hendershott Report, ¶65.

¹⁵ Werner Report, ¶154.

¹⁶ Werner Report, ¶155.

¹⁷ Hendershott Deposition, at 19:3-7.

¹⁸ Hendershott Deposition, at 19:24-20:9. As the Werner Report documented, at least nine analysts issued FXCM research reports and/or recommendations. An additional three analyst firms followed FXCM, based on transcripts of earnings calls.

A. I didn't dispute that.¹⁹

Q: Okay. Do you agree that the par value of FXCM notes was larger than 40 percent of all publically traded companies listed on the NYSE Amex, NASDAQ and ARCA, A.R.C.A.?

A: I don't remember disputing that calculation.²⁰

14. Dr. Hendershott's contentions are related solely to questioning whether my *Cammer* and *Krogman* findings compel a conclusion of market efficiency for the FXCM Notes. I address each of Dr. Hendershott's more specific arguments in Section III.B of this report.
15. Finally, in Section IV.D, I address Dr. Hendershott's criticism that the common damages methodology I proposed cannot accommodate Plaintiffs' theory of liability.²¹

A. Dr. Hendershott's Portrayal of Market Efficiency in Bond Markets Disingenuously Suggests That Bond Markets are Less Efficient by Default

16. Dr. Hendershott devotes roughly 9 pages of his 53-page report to an exposition on the concept of market efficiency and the characteristics of bond markets. However, in discussing market efficiency, Dr. Hendershott relies on literature and treatises that are primarily focused on equity markets. Then, in discussing the features of bond markets, Dr. Hendershott misleadingly creates the impression that bond markets are somehow naturally inefficient because the features of bond markets do not align with efficient equity market characteristics. This is an unsupported opinion. Because bond markets are fundamentally different from equity markets, different thresholds and metrics for market efficiency must be applied. The characteristics that promote market efficiency for equities may not be found in the same form or the same levels in debt securities, but this does not imply that debt markets are less efficient by definition.
17. Dr. Hendershott recognizes debt markets to generally be "decentralized, more opaque, and less liquid"²² *than equity markets*. However, he does not address the question of whether the market for FXCM Notes was sufficiently efficient for a debt security. It is this latter

¹⁹ Hendershott Deposition, at 21:2-4.

²⁰ Hendershott Deposition, at 21:5-11.

²¹ Hendershott Report, ¶97-98.

²² Hendershott Report, ¶32.

question, which Dr. Hendershott does not answer, that is imperative for assessing whether FXCM Notes traded in an efficient market. Dr. Hendershott effectively argues that bond markets are generally inefficient – a position that is untenable with the literature on bond markets.

18. That bond markets are generally efficient despite their so-called “decentralized, more opaque, and less liquid” nature is well established in the economics literature, for example:

Using a unique dataset based on daily and hourly high-yield bond transaction prices, we find the informational efficiency of corporate bond prices is similar to that of the underlying stocks. We find that stocks do not lead bonds in reflecting firm-specific information. We further examine price behavior around earnings news and find that information is quickly incorporated into both bond and stock prices, even at short return horizons. Finally, we find that measures of market quality are no poorer for the bonds in our sample than for the underlying stocks.²³

We note that an assumption underlying our event study approach is that the bond market is reasonably efficient at pricing value-relevant information on a timely basis. While the informational efficiency of the U.S. equity markets is relatively well established (Fama 1991), much less analysis has been conducted regarding the efficiency of the bond markets. However, Hotchkiss and Ronen (2002), in a study that explores the efficiency of the bond market, conclude that the informational efficiency of corporate bonds is similar to that of the underlying stocks. To the extent that some of the bonds used in our analysis are not efficient with respect to earnings news, it biases against finding a significant bond quote reaction to earnings news.²⁴

But a frictionless market in which all information is freely available and investors agree on its implications is, of course, not descriptive of markets met in practice. Fortunately, these conditions are sufficient for market efficiency, but not necessary. For example, as long as transactors take account of all available information, even large transactions costs that inhibit the flow of transactions do not in themselves imply that when transactions do take place, prices will not “fully reflect” available information. Similarly (and speaking, as above, somewhat loosely), the

²³ “The Informational Efficiency of the Corporate Bond Market: An Intraday Analysis,” by Edith Hotchkiss and Tavy Ronen, *The Review of Financial Studies*, Vol. 15, No. 5, 2002, p. 1325.

²⁴ “The Timeliness of the Bond Market Reaction to Bad Earnings News*,” by Mark Defond and Jieyinh Zhang, *Contemporary Accounting Research*, Vol. 31, No. 3, 2014, pp. 919-20.

market may be efficient if “sufficient numbers” of investors have ready access to available information. And disagreement among investors about the implications of given information does not in itself imply market inefficiency unless there are investors who can consistently make better evaluations of available information than are implicit in market prices.²⁵

Casual empiricism suggests that a great deal of professional arbitrage activity, such as that of hedge funds, is concentrated in a few markets, such as the bond market and the foreign exchange market. These also tend to be the markets where extreme leverage, short selling, and performance-based fees are common. In contrast, there is much less evidence of such activity in the stock market, either in the United States or abroad. Why is that so? Which markets attract arbitrage? Part of the answer is the ability of arbitrageurs to ascertain value with some confidence and to be able to realize it quickly. In the bond market, calculations of relative values of different fixed income instruments are doable, since future cash flows of securities are (almost) certain. As a consequence, there is almost no fundamental risk in arbitrage.²⁶

Since 1990, the Securities and Exchange Commission has allowed firms to sell security issues to qualified institutional buyers under so-called Rule 144A. Rule 144A issues are not required to be registered with the SEC and may not be resold to individual investors, but may be traded between qualified institutional buyers. Rule 144A issues may have “registration rights,” which require the issuer to exchange the original Rule 144A issue for a public bond issue within a stipulated period. If the exchange does not occur, the issuer must pay a higher interest rate. The basic justification for the waiver of advance registration is the belief that large institutional buyers are sophisticated investors and do not need the SEC to examine each offering of securities in depth. Public issues of securities are required to be registered before they are offered for sale to individual investors, however, who are presumed to be less sophisticated and informed than large institutional buyers.²⁷

²⁵ “Efficient Capital Markets: A Review of Theory and Empirical Work,” by Eugene Fama, *Journal of Finance* 25 (2), 1970, pp. 387-8.

²⁶ “The Limits of Arbitrage,” by Andrei Shleifer and Robert Vishny, *Journal of Finance* 52 (1), 1997, pp. 49-50.

²⁷ “The Impact of Rule 144A Debt Offerings Upon Bond Yields and Underwriter Fees,” by Miles Livingston and Lei Zhou, *Financial Management*, 2002, p. 5.

Securities issued under Rule 144A do not require registration with the SEC, but can be traded without restriction in the secondary market among “qualified institutional buyers,” or QIBs. Rule 144A issues, which are technically private placements, enjoy a much more liquid secondary market than traditional private issues.²⁸

19. Clearly, the academic literature does not comport with Dr. Hendershott’s representation of bond markets as being generally less efficient than equity markets. Dr. Hendershott’s critiques of my market efficiency analysis for the FXCM Notes stem from his misconception of what an efficient bond market looks like. His critiques rely on comparing characteristics of FXCM Notes to characteristics of equities. This flawed comparison renders Dr. Hendershott’s opinions uninformative and his conclusions unreliable for assessing whether the FXCM Notes traded in an efficient market.

B. Dr. Hendershott Incorrectly Concludes That *Cammer* and *Krogman* Factors Do Not Support Market Efficiency For The FXCM Bonds

20. In the Werner Report, I found that the FXCM Notes satisfied the first four *Cammer* factors and first two *Krogman* factors. Specifically, I found that the FXCM Notes: i) had an average weekly turnover of 2.92% for the Notes Period; ii) had at least 12 analyst firms that issued recommendations and/or research reports or otherwise followed FXCM; iii) had at least 3 analysts that stated they made a market in FXCM securities and had between 35% and 40% of its trades be dealer transactions; iv) were eligible for S-3 registration; v) had an outstanding par amount that was larger than even the market capitalizations of 40% of public companies listed on the NYSE, AMEX, NASDAQ, and ARCA; and vi) had the same “float” – i.e. no notes were held by insiders.²⁹ Importantly, ***Dr. Hendershott does not contest any of these factual findings.***
21. Instead, Dr. Hendershott takes issue with the conclusions that I drew based on these findings. As I explain below, Dr. Hendershott’s critiques of my conclusions stem from his false premise that bond markets are generally less efficient than stock markets.

²⁸ “The Impact of Rule 144A Debt Offerings Upon Bond Yields and Underwriter Fees,” by Miles Livingston and Lei Zhou, *Financial Management*, 2002, p. 7.

²⁹ Werner Report, ¶¶123-155.

i. Volume

22. Dr. Hendershott contends that “Dr. Werner does not provide a clear and reliable benchmark for what level of average weekly trading volume would be consistent with bond market efficiency” and that “Dr. Werner provides no justification why it is appropriate to apply the *Cammer* benchmark developed for equities to the bond market, which as discussed above is ‘inherently different.’”³⁰
23. To clarify, I compared the level of average weekly trading volume for the FXCM Notes to the *Cammer* benchmark for common stock. I also explained in the Werner Report that the “average weekly trading volume may be much lower for the FXCM Notes than the common stock due to the inherently different nature of how bonds are transacted and therefore the typical threshold of 2% average weekly volume needed for a strong presumption of market efficiency should be relaxed in assessing bond efficiency.”³¹ That the FXCM Notes had an average weekly trading volume of 2.92%, which is higher than even the strong presumption of market efficiency for equity securities, is therefore supportive of market efficiency for the Notes. Dr. Hendershott fails to recognize that by passing the more stringent benchmark for equities, the FXCM Notes also pass any lower benchmark that would be more appropriate for how debt securities trade.
24. If Dr. Hendershott finds the application of the *Cammer* volume benchmark itself inappropriate, his opinion is at odds with financial principles and what I understand Courts have found to be informative of market efficiency for debt securities. Courts have specifically recognized the applicability of the *Cammer* factors to debt securities and note that, if anything, the *Cammer* benchmarks should be relaxed (*not* made more stringent) for debt securities.

A test based on the so-called ‘Cammer factors’ has been ‘routinely applied by district courts considering the efficiency of equity markets,’ and has also been applied, in modified form, ‘to bond markets with a recognition of the differences between the manner in which debt bonds and equity securities trade.’ *Id.*; see also *Cammer v. Bloom*, 711 F. Supp. 1264,

³⁰ Hendershott Report, ¶¶44-45.

³¹ Werner Report, ¶123.

1286–87 (D.N.J. 1989) (articulating five factors); *Krogman v. Sterritt*, 202 F.R.D. 467, 478 (N.D. Tex. 2001) (describing three additional factors that are commonly included in Cammer analyses); *In re Enron Corp. Sec.*, 529 F. Supp. 2d 644, 747–49 (S.D. Tex. 2006) (applying the Cammer factors in modified form to debt securities).³²

Granted, significant differences exist between stocks and bonds, the way each is priced, and the way each is traded. However, few courts have wrestled with this issue and little separate guidance has been provided for analyzing the efficiency of the bond market. As one court noted: ‘a comparison between equity and bond markets is a comparison between the proverbial apple and orange.’ *In re Enron Corp. Sec.*, 529 F.Supp.2d 644, 755 (S.D.Tex.2006). In fact, when faced with an opportunity to ‘address the nettlesome question of whether, for the purposes of determining the applicability of the fraud-on-the-market doctrine, an adjusted set of Cammer factors or even a different analytical approach altogether is better suited to analyze market efficiency in securities cases arising from the sale of debt instruments,’ the Second Circuit declined that opportunity. *Teamsters Local 445 Freight Div. Pension Fund v. Bombardier Inc.*, 546 F.3d 196, 205 n. 11, 210-11 (2d Cir.2008) (affirming district court’s use of Cammer factors to deny class certification motion without accepting the factors as a test for market efficiency). Even though the factors developed for assessing the market efficiency for stocks ‘are admittedly not well-suited for the analysis of debt securities [.]’ courts generally apply the same factors to the efficiency question for bonds. *DVI*, 249 F.R.D. at 214. Indeed, trying to make a market for bonds fit into the factors recognized for stocks is sometimes like trying to make a square peg fit into a round hole. Few courts have addressed the effect of the differences between the two markets on the efficiency factors. The court agrees that ‘[n]evertheless, corporate bond investors cannot be categorically denied an opportunity to utilize the fraud-on-the-market theory simply because of a structural difference in the way that debt securities are marketed and traded vis-a-vis equity securities.’³³

25. Further, Dr. Hendershott contends that my “analysis of the FXCM Notes’ average weekly trading volume fails to accurately depict the evolving liquidity conditions of the FXCM Notes during the Putative Notes Class Period.”³⁴ Had Dr. Hendershott considered the

³² *In re Petrobras Securities*, Case No. 16-1914, United States Court of Appeals, Second Circuit, filed July 7, 2017, pp. 57-58.

³³ *In re Healthsouth Corporation Securities Litigation*, Case No. CV-03-BE-1501-S, United States District Court for the Northern District of Alabama Southern Division, filed September 30, 2009, pp. 21-22.

³⁴ Hendershott Report, ¶46.

average weekly trading volume for the FXCM Notes following the “dramatic changes in its business and financial condition stemming from the 2015 ‘flash crash’,” he would have found that the average weekly trading volume remained above the 1% *Cammer* threshold for a substantial presumption of market efficiency even after the 2015 flash crash.³⁵

26. Dr. Hendershott also argues that if one were to look at average weekly trading volume on a week-to-week basis, the FXCM Notes’ weekly volumes would fall below the 1% *Cammer* threshold on many weeks during the Notes Period.³⁶ I am aware of no academic or legal support for examining market efficiency on a week by week basis. I am also unaware of any impediments to trading in the FXCM Notes during the weeks when its average volume fell below the 1% threshold.
27. Further, as Dr. Hendershott acknowledges,³⁷ the trading behavior in bond markets differs markedly from trading in the stock market. In fact, Dr. Hendershott contends that “studies have found that the median corporate bond does not trade on a majority of trading days.”³⁸ Typically, the bond market is made up of large institutional investors, pensions funds, and hedge funds that trade in much larger volumes per transaction than typical trades in the stock market.³⁹ Bond trades tend to be larger but less frequent than typical stock trades. However, as the large trades are generally conducted by large institutions, the market participants are well informed, and trade decisions are backed by research and analysis. While the FXCM Notes may not have traded every day during the Notes Period, this pattern is typical in the bond market,⁴⁰ is not unique to FXCM Notes, and does not indicate an inefficient market.

³⁵ Following the 2015 flash crash, the FXCM Notes had an average weekly trading volume of 1.12% up to the end of the Class Period.

³⁶ Hendershott Report, ¶49.

³⁷ Hendershott Report, ¶¶24-30.

³⁸ Hendershott Report, ¶30.

³⁹ For example, a typical bond transaction is 50 times larger than a typical stock transaction. See, “An Empirical Study of Bond Market Transactions,” by G. Hong and A. Wurga, *Financial Analysts Journal*, Vol. 56, No. 2, March/April 2000.

⁴⁰ For example, a published, peer-reviewed, study by Mahanti et al. [2008] observes that relatively few corporate bonds trade more frequently than on 200 days in a year. See, “Latent Liquidity: A New Measure Of Liquidity, With An Application To Corporate Bonds,” by Sriketan Mahanti, et al., *Journal of Financial Economics*, 2008.

ii. Analyst Coverage

28. Dr. Hendershott raises two issues with respect to my evaluation of analyst coverage for the FXCM Notes: 1) I “fail[ed] to ascertain whether there was coverage specific to the Notes” and the existing analyst coverage was “primarily equities-focused”,⁴¹ and 2) I ignored that “the number of analyst reports released by quarter decreased drastically over the course of the Putative Notes Class Period.”⁴² Dr. Hendershott’s critiques appear to suggest that the information provided by analysts for a company’s equity securities are of no value to that company’s bond investors. This position is untenable and at odds with the finance literature.
29. As an initial matter, just because an equity analyst report may not provide price targets or recommendations for a company’s debt securities does not imply that the information disseminated - and the analysis provided - by equity analysts are of no importance to bond investors. This is particularly true in the case of convertible bonds similar to the FXCM Notes. Equity analyst reports do not just comment on the price of a company’s common stock. Equity analyst reports, and the analyst reports for FXCM in particular, cover a wide swath of relevant financial information that can be used by bond investors for making investment decisions. For example, analysts provide projections on cash flows, earnings, assets, liabilities, and more. These metrics bear on the company’s financial health and ability to continue as a going concern. Therefore, at the very least, analyst reports provide debt investors with relevant information for assessing a company’s ability to pay off its debt and its likelihood of bankruptcy.⁴³ The literature attests to the fact that these determinations are a major factor in bond pricing:

⁴¹ Hendershott Report, ¶¶53-54.

⁴² Hendershott Report, ¶55.

⁴³ During his deposition, Dr. Hendershott agreed that equity analyst can provide relevant information to debt investors. *See*, for example, Hendershott Deposition, at 48:18-24 and 49:24-50:10.

The price of any financial instrument is equal to the present value of the expected cash flow. The interest rate or discount rate used to compute the present value depends on the yield offered on comparable securities in the market. In this chapter we shall explain how to compute the price of a noncallable bond. The pricing of callable bonds is explained in Chapter 37.⁴⁴

Given the cash flows of a bond and the required yield, we have all the necessary data to price the bond. The price of a bond is equal to the present value of the cash flows, and it can be determined by adding (1) the present value of the semiannual coupon payments and (2) the present value of the par or maturity value.⁴⁵

30. That the FXCM analysts provided important information to FXCM Notes investors can also be observed in the FXCM analyst report themselves. Of the 246 analyst reports published during the Notes Period, 103 mentioned the term “cash flow,” 210 mentioned “liquidity,” and 8 mentioned “solvency.” The following excerpts from FXCM analyst reports further demonstrate that analysts not only mentioned these metrics but also provided additional discussion and analysis relevant to bond investors:

FXCM cash flow generation is significant, allowing for buybacks and dividends. With a meaningful rise in deal related depreciation, we highlight that FXCM’s cash flow generation is meaningfully higher than its GAAP net income. As such, FXCM is well positioned to buy back additional stock and to pay out dividends when the regulatory rule changes from MF are released.⁴⁶

While the U.S. operations generated \$48 million in revenues in 2016, they were also EBITDA negative; if FXCM is able to reduce most of the costs associated with the U.S. business, the sale of the business may not reduce go forward EBITDA too much. But it’s no sure thing they can cut costs that much; for example, we think it depends on how they were allocating some corporate level expenses to the U.S. previously. Also, as a financial

⁴⁴ “Bond Pricing, Yield Measures, and Total Return” by Frank J. Fabozzi and Frederick Frank, Chapter 5, in *The Handbook of Fixed Income Securities*, 7th edition, edited by Frank J. Fabozzi and Steven V. Mann, McGraw-Hill, 2005, p. 73.

⁴⁵ “Bond Pricing, Yield Measures, and Total Return” by Frank J. Fabozzi and Frederick Frank, Chapter 5, in *The Handbook of Fixed Income Securities*, 7th edition, edited by Frank J. Fabozzi and Steven V. Mann, McGraw-Hill, 2005, p. 75.

⁴⁶ “Better Sept Helps A Soft 3Q. We See Opportunities for Growth With or Without a Recovery in Volatility,” by Kenneth Worthington and Rahul Nevatia, JPMorgan, analyst report, October 1, 2012, p. 1.

services company, it is certainly not a good thing for their ongoing foreign operations that they were pretty much forced out of the U.S. and that their debt and equity prices put parent level solvency into question (at least in the market's minds). Solvency was, of course, always a question but now it is a front and center question.⁴⁷

What happened? Details are sparse but we believe FXCM's liquidity providers stopped making markets in the Swiss Franc leaving the company unable to close losing client positions as the cushion provided by client collateral was absorbed. The company traditionally marks to market open client positions ~4x a second and has been in operation since 1999.⁴⁸

We are updating our thoughts on the 2.25% convertible notes. There are three major sources of value that will flow into the waterfall established by the new Leucadia agreement: (1) cash, (2) asset sale proceeds, and (3) the value of continuing operations.⁴⁹

High leverage the likely culprit. Most, including ourselves, had perceived FXCM's primarily agency based model as low risk, especially compared to peer retail FX broker, GAIN Capital (GCAP), who operates a principal based model. However, we've been informed that FXCM offered clients leverage of 50x (often the standard in the U.K.) for EUR/CHF trades. Note: we were informed by GCAP management at an analyst dinner last evening that they had reduced leverage on EUR/CHF trades to 20x in September 2014. We believe this high leverage combined with the unique (black swan-like) event of the floating of the Swiss franc currency contributed to the steep customer losses at FXCM.⁵⁰

31. Thus, whether there are analyst reports published specifically for FXCM Notes is of lesser importance than the fact that there were analysts covering the firm in general. That there were a significant number of analysts covering FXCM and providing information and analyses useful to both equity and debt investors is an indicator of market efficiency for FXCM Notes.

⁴⁷ "FXCM Settles with Regulators, Plans to Exit U.S. Business," by David Epstein and Patrick Marshall, Cowen and Company, analyst report, February 7, 2017, p. 1.

⁴⁸ "Downgrade to Underperform; Capital Raise Critical for Solvency," by Ashely Serrao and Christian Bolu, Credit Suisse, analyst report, January 16, 2015, p. 1.

⁴⁹ "1Q16 Results Show Signs of Stability," by David Epstein and Patrick Marshall, Cowen and Company, analyst report, May 10, 2016, p. 3.

⁵⁰ "High Leverage + Black Swan Currency Event = Heavy Customer Losses," by Richard Repetto, et al., Sandler O'Neill Partners, analyst report, January 16, 2015, p. 1.

32. Dr. Hendershott's second argument appears to be that because the number of analysts covering FXCM "decreased drastically over the course of the Putative Notes Class Period," the market for FXCM Notes also became less efficient.⁵¹ Contrary to Dr. Hendershott's implication, even though the number of analysts following FXCM declined over the course of the Class Period, the fact that the Company had at least one analyst following it throughout the Notes Period is supportive of market efficiency.⁵² Empirical academic research has found that coverage by even one analyst strengthened the presumption of efficiency.

Thus, a stock with at least one analyst and volume in excess of 6.49 would, on average, be presumed efficient with respect to the information contained in earnings.⁵³

iii. Market Makers

33. Dr. Hendershott alleges that my analysis of the market maker *Cammer* factor is insufficient because I did not assess "whether the FXCM Notes specifically had market makers throughout the Putative Notes Class Period"⁵⁴ and that I did "not address Cammer Factor No. 3's reference to arbitrageurs."⁵⁵ Dr. Hendershott is wrong on his first argument and misses the point in his second argument.
34. First, I did assess whether FXCM Notes specifically had market makers. In the Werner Report, I found that "according to the trades reported to TRACE, between 35% and 40% of the trades reported were dealer transactions which results from a large number of dealers facilitating transactions similarly to how Market Makers increase the efficiency of the equity market."⁵⁶ I also found that:

⁵¹ Hendershott Report, ¶55.

⁵² As shown in Dr. Hendershott's Exhibit-3, at least 1 analyst followed FXCM throughout the Class Period. While Dr. Hendershott presents the number of analysts in 1Q 2017 as being "0," he fails to mention that Oppenheimer and Cowen and Company analysts published a report on February 7, 2017.

⁵³ "The Fraud-on-the-Market Theory and the Indicators of Common Stocks' Efficiency," by Brad Barber, et al., *The Journal of Corporation Law*, 1994, p. 310.

⁵⁴ Hendershott Report, ¶58.

⁵⁵ Hendershott Report, ¶59.

⁵⁶ Werner Report, ¶134.

The FXCM notes were placed into the financial marketplace by prominent underwriters. The FXCM notes were purchased by Credit Suisse and Merrill Lynch, Pierce, Fenner & Smith as representatives of the additional purchasers. According to the Company's offering circular for the FXCM notes, The Bank of New York Mellon acted as the trustee, paying agent, note registrar, custodian and conversion agent.⁵⁷

35. Thus, Dr. Hendershott's assertion that I did not identify any market makers for the FXCM Notes is wrong. While Dr. Hendershott notes that I did not identify who the specific dealers were, this information was unavailable. The lack of this datapoint does not imply that, "one cannot use this data to ascertain which dealers made a market in the FXCM Notes."⁵⁸ The relevant question for this *Cammer* factor is whether the FXCM had market makers – i.e. whether market makers existed at all. It is my understanding that a determination of the exact identity of each market maker is not required for a determination that dealers indeed made a market in FXCM Notes.
36. Dr. Hendershott's contention that I did "not address *Cammer* Factor No. 3's reference to arbitrageurs"⁵⁹ inappropriately discounts the role of market makers and dealers in providing arbitrage functions for the market. The literature attests to the fact that market makers and dealers promote market efficiency precisely because they assist in arbitrage functions:

Third, it could be alleged the stock had numerous market makers. The existence of market makers and arbitrageurs would ensure completion of the market mechanism; these individuals would react swiftly to company news and reported financial results by buying or selling stock and driving it to a changed price level.⁶⁰

Number of market makers. Over-the-counter market makers, who provide a market for securities, are presumably knowledgeable about the issuing company and the stocks' supply and demand conditions (i.e., the 'order

⁵⁷ Werner Report, ¶131.

⁵⁸ Hendershott Report, ¶58.

⁵⁹ Hendershott Report, ¶59.

⁶⁰ *Cammer*, 711 F.Supp. at 1286-87.

flow'). Therefore, it is believed the larger the number of market makers in a given security, the more information is available about it and the quicker its dissemination in the price. This efficiency driver has been mentioned in several legal proceedings.⁶¹

37. Contrary to Dr. Hendershott's representation, I did address *Cammer* factor 3's reference to arbitrageurs. My finding that the trading of FXCM Notes was facilitated by bond dealers is sufficient to establish that the FXCM Notes traded in the presence of arbitrageurs, which indicates market efficiency. Further, in an 144a issue, the price of the notes is set by the underwriters after polling QIBs for their level of interest and pricing expectations.⁶² In the pricing process, the underwriter and investors will perform the same analyses as analysts do in the secondary market (e.g. comparative companies analysis, earnings potential, expected growth, and macro-economic analyses etc.). Thus, the pricing of an 144a issue is driven by the same valuation considerations as the pricing of a registered issue in the secondary market.

iv. Market Capitalization and Float

38. The Hendershott Report lays out two criticisms of my analysis of these *Krogman* factors. First, Dr. Hendershott states that I "fail[ed] to mention that the market value and float for the FXCM Notes were much lower than the par value during most of the Putative Notes Class Period."⁶³ Second, Dr. Hendershott notes that the comparison of bond par values to equity market capitalization, "simply represents an apples-to-oranges comparison"⁶⁴ and "is not instructive, from an economic perspective, in measuring the relative size of the FXCM Notes or its implication on market efficiency."⁶⁵
39. Despite Dr. Hendershott's concern that I did not assess the market value of the FXCM Notes and rather the par value, he has failed to offer any support for why market value would be a more appropriate metric to consider. It is my understanding that the size factor

⁶¹ "The Fraud-On-The-Market Theory and The Indicators of Common Stocks' Efficiency," by Brad M. Barber, et al., *The Journal of Corporation Law* Winter 1994, p. 291.

⁶² "Corporate Bond Operational Underwriting Process: Business Practices in 'Plain English,'" *The Bond Market Association*, December 9, 2004, pp. 4, 12.

⁶³ Hendershott Report, ¶62.

⁶⁴ Hendershott Report, ¶63.

⁶⁵ Hendershott Report, ¶63.

encapsulated by these *Krogman* factors is considered by courts because these factors bear on the prominence of a company and therefore its ability to attract market interest. Thus, the market capitalization of FXCM common stock alone is enough to satisfy these *Krogman* factors for the FXCM Notes. If Dr. Hendershott is taking issue with whether FXCM was large enough to attract market attention, an affirmative answer is already provided in my analysis of the FXCM common stock.

40. Dr. Hendershott's second criticism fails to acknowledge why market capitalization is considered by courts as an indicator of efficiency. As stated in the Werner report, the court in *Krogman* held that "[m]arket capitalization, calculated as the number of shares multiplied by the prevailing share price, may be an indicator of market efficiency because there is a greater incentive for stock purchasers to invest in more highly capitalized corporations."⁶⁶ The relevance of market capitalization to market efficiency is related to the prominence of the Company, as a whole. Since the Company's market capitalization and float were relatively high, the prominence it enjoyed facilitates efficiency for the FXCM common stock as well as the convertible Notes.
41. Dr. Hendershott's complaint that I inappropriately compared the par value of FXCM Notes to the market capitalizations of entire companies is misguided. While he appears to take issue with the apples-to-oranges comparison, Dr. Hendershott fails to recognize that such an apples-to-orange comparison biases against a finding of market efficiency. Given that companies on average do not tend to issue more debt than their total equity value, a comparison of the FXCM Notes par value to other similar debt issuances would likely be even more in favor of a conclusion that the FXCM Notes traded in an efficient market.

v. *Bid-Ask Spread*

42. Regarding this *Krogman* factor, Dr. Hendershott notes that I did not analyze the bid-ask spreads for FXCM Notes. But he fails to consider that the missing bid-ask spread analysis for FXCM Notes is due to the fact that 1) such data was not available to me; and 2) bid-ask spreads are not informative of efficiency for bond markets.⁶⁷ I would also note that Dr. Hendershott has not provided any methodology or any data to perform such an analysis.

⁶⁶ *Krogman*, 202 F.R.D. at 478.

⁶⁷ Hendershott Report, ¶60.

The only bid-ask spread information that Dr. Hendershott offers comes from the deposition testimony of the Lead Plaintiff.⁶⁸

43. As an initial matter, the deposition testimony of one investor is not sound analysis – especially so considering that such testimony was purely based on the Lead Plaintiff’s memory and no data was referenced during that deposition to either confirm or deny the investor’s recall. Further, even if the bid-ask spread of the FXCM Notes was wide, the literature supports the view that a wide bid-ask spread in debt securities is not an indication of inefficiency:

Other measures used in prior research to describe market quality include liquidity, the bid-ask spread and market depth. While data constraints limit our ability to examine these latter elements for corporate bonds, the time-series properties of the hourly data afford the computation of the pricing error variances that measure market quality. Our results are not inconsistent, however, with other recent findings on market quality for the high-yield debt markets. Hong and Warga (2000) estimate effective bid-ask spreads in the ABS market and the dealer market based on insurance company transactions and find that high-yield bonds have similar spreads in both markets. Chakravarty and Sarkar (1999) report similar spreads in bid-ask estimates for high-yield bonds for the same database of insurance company trades. Our finding that market quality is no poorer for the bonds in our sample than for their underlying stock is consistent with their findings that trading costs do not appear to be unusually high for insurance company trades in corporate bonds.⁶⁹

44. Finally, that bid-ask spread data is not readily available for debt securities is understood by courts that have deliberated on market efficiency for bonds. In such instances, courts have reasoned that “[t]he lack of such readily-available information is not determinative of the efficiency of the market for [] bonds when other factors support a finding of efficiency.”⁷⁰

⁶⁸ Hendershott Report, ¶60.

⁶⁹ “The Informational Efficiency of the Corporate Bond Market: An Intraday Analysis,” by Edith Hotchkiss and Tavy Ronen, *The Review of Financial Studies*, 2002, Vol. 15, No. 5, pp. 1351-1352.

⁷⁰ *In re HealthSouth Corporation Stockholder Litigation*, 30 September 2009, p. 38.

Corporate bond markets lack widely reported bid-ask spreads. Defendants' experts attack this lack of information as indicative of a lack of market transparency and thus reflective of an inefficient market for bonds in general. *See* James Rept. I (doc. 1217 Ex. 14) ¶¶75-78; Gibbons Rept. I ¶¶24-27. Again Defendants expect the bond market – a different animal – to function just like the stock market. The lack of such readily-available information is not determinative of the efficiency of the market for HealthSouth bonds when other factors support a finding of efficiency.⁷¹

C. My Event Study For The FXCM Notes Demonstrates Market Efficiency

45. In the Werner Report, I performed an event study on two events for the FXCM Notes. As I explained, “because of bonds’ seniority in the capital structure of a company, bonds’ values and therefore prices are insulated from all but the most extreme news by a common stock valuation cushion. As a result, bonds are typically the least sensitive of all securities to company-specific news while being the most sensitive to a change in a firm’s probability of default.”⁷² Dr. Hendershott agrees with this premise:

Specifically, when a firm is financially healthy and the likelihood of default is remote, bondholders are expected to receive pre-specified interest and principal amounts and therefore the prices of that firm’s bonds will be relatively insensitive to firm specific news.⁷³

46. I also noted in the Werner Report that because of this “equity buffer” provided by the FXCM common stock, only the most extreme events should be selected for an event study on FXCM Notes. Therefore, not all of the event study events selected for FXCM common stock would make suitable candidates for a bond market efficiency event study.⁷⁴ Based on this economic reality, I selected January 16, 2015 and February 7, 2017 as appropriate events for a bond event study as they had the potential to materially impact the firm’s financial viability and the future cashflow expectations of investors in FXCM Notes.⁷⁵ My event study found that both event dates elicited statistically significant price reactions in the

⁷¹ In *re HealthSouth Corporation Stockholder Litigation*, 30 September 2009, p. 38.

⁷² Werner Report, ¶137.

⁷³ Hendershott Report, ¶114.

⁷⁴ Werner Report, ¶137.

⁷⁵ Werner Report, ¶¶138-140.

FXCM Notes, thus demonstrating a cause and effect relationship between the release of new information and reactions in the price of the FXCM Notes, which is indicative of market efficiency.⁷⁶

47. Dr. Hendershott presents three critiques with respect to the event study that I performed for FXCM Notes: 1) I “only examine[d] two trading days, one of which falls outside the Putative Notes Class Period”;⁷⁷ 2) I selected “these dates in an unscientific and biased way”;⁷⁸ and 3) I did “not test if the FXCM Notes traded efficiently with respect to the specific type of information alleged to have been misrepresented.”⁷⁹
48. In addition to these three critiques, Dr. Hendershott also takes issue with the fact that my “methodology for assessing *Cammer* Factor No. 5 differs for FXCM’s common stock and the FXCM Notes”⁸⁰ and notes that had I performed the same news vs. no-news test for the FXCM Notes as I did for the common stock, “the results of this test [would provide] evidence inconsistent with his conclusion of the FXCM Notes trading in an efficient market.”⁸¹ Finally, Dr. Hendershott states that I made “numerous methodological errors when implementing his event study.”⁸²
49. I address each of Dr. Hendershott’s critiques and criticisms in turn below.

i. Dr. Hendershott Offers No Support For His Opinion That Two Events Cannot Demonstrate Market Efficiency

50. Dr. Hendershott states that “an event study examining the Notes price reaction on only two trading days cannot reliably demonstrate market efficiency throughout the two-and-half year Putative Notes Class Period.”⁸³ Dr. Hendershott has offered no support, nor am I aware of any that exists, to support this statement. Effectively, Dr. Hendershott is asserting that my event study for FXCM is not enough for a demonstration of the cause and effect

⁷⁶ Werner Report, ¶¶149-151.

⁷⁷ Hendershott Report, ¶66.

⁷⁸ Hendershott Report, ¶66.

⁷⁹ Hendershott Report, ¶66.

⁸⁰ Hendershott Report, ¶79.

⁸¹ Hendershott Report, ¶79.

⁸² Hendershott Report, ¶92.

⁸³ Hendershott Report, ¶67.

relationship because he does not believe it to be enough. Such an unsupported argument is not sound economic analysis and, absent any evidence to the contrary, the event study that I did perform does provide a demonstration of FXCM Notes' reaction to new, Company-specific information.

51. In fact, during his deposition, Dr. Hendershott admitted that he does not know of any academic source that supports his position that two events cannot demonstrate market efficiency.

Q. Professor Hendershott, can you cite any academic literature that supports the assertion that two dates are insufficient for showing satisfaction of Cammer factor No. 5?

A. I have trouble thinking about an exact academic paper that has tried to do address that.⁸⁴

52. It is also important to note that my event selection for the FXCM Notes is the same as my event selection for FXCM common stock. As I stated in the Werner Report, "Of the three events I selected for testing FXCM common stock market efficiency, only two events, January 15, 2015 (after the close of trading) and February 7, 2017, occurred following the issuance of the FXCM notes."⁸⁵ Therefore, contrary to Dr. Hendershott's representations, I did not take "a different approach when assessing FXCM's common stock."⁸⁶

ii. Dr. Hendershott's Accusation That My Event Selection Was Unscientific and Biased is Baseless

53. Dr. Hendershott claims that I did not identify "an objective set of criteria that [I use] to select the two event days [I consider] here."⁸⁷ He is wrong. In the Werner Report, I explicitly identified the objective set of criteria that I used to arrive at the three event study events that I tested:

⁸⁴ Hendershott Deposition, at 63:22-64:4.

⁸⁵ Werner Report, ¶138.

⁸⁶ Hendershott Report, ¶69.

⁸⁷ Hendershott Report, ¶72.

The first empirical test was an event study that investigates whether the market for FXCM common stock was efficient specifically with respect to the disclosure of information that is the subject of this litigation. Statistically significant price reactions to disclosures of new information related to the alleged misrepresentations and omissions indicate market efficiency. Consequently, the empirical behavior of FXCM's stock following the disclosure of case-related information best determines whether the market for FXCM's stock was efficient for purposes of the fraud-on-the-market principle.⁸⁸

I also performed an event study on significant acquisition announcements by FXCM during the Class Period. Consistent with financial principles and academic literature, announcements of large acquisitions could be expected to impact the value of the Company. It follows that on certain dates when the Company announced an acquisition, the value of FXCM common stock would be expected to move. Significant stock price reactions to such an event indicates market efficiency.⁸⁹

In addition, I performed an event study on announcements of FXCM's breach of regulatory capital requirements during the Class Period. The regulatory capital requirement is the minimum net capital that FXCM needs to maintain across its subsidiaries in a relatively liquid form. A firm in breach of its minimum net capital requirements may have its registration revoked which could result in liquidation. Announcements of a breach of regulatory capital requirements could be expected to impact the value of the Company. It follows that on dates when the Company announced such a breach, the value of FXCM common stock would be expected to move. A significant stock price reaction to such an event indicates market efficiency.⁹⁰

54. Given that Dr. Hendershott identified no additional events that should have been included in my event study and identified no events that should have been removed, he was clearly able to follow my event selection methodology to arrive at the same three events that I tested. Not only did I identify three objective criteria for my event study, but Dr. Hendershott's arrival at the same three events that I selected confirms that my criteria were replicable.

⁸⁸ Werner Report, ¶46.

⁸⁹ Werner Report, ¶47.

⁹⁰ Werner Report, ¶48.

55. Dr. Hendershott's only other contention is his speculation that my event selection suffers from "hindsight bias."⁹¹ His speculation is unfounded. The selection of the three event study events was based on the objective screens described in the Werner Report, which relied on a review of all news articles and analyst reports during the Class Period. Dr. Hendershott does not contend that the information disclosed on the three dates that I selected was unimportant or ignored by market participants, analysts, and the news media. That I focused on these for a market efficiency event study was a result of the important news that came out, not the fact that others also observed and reacted to that important news. Dr. Hendershott cannot and does not dispute that the event dates were important dates in the life of the Company during the Class Period. As such, they are objectively appropriate event dates for a market efficiency event study.
56. Further, Dr. Hendershott's accusation that because I reviewed the Complaint, "[I] would therefore presumably have known when choosing this date that a large security price movement had occurred on" the February 7, 2017 event falls flat in light of the importance of statistical analysis.⁹² Though the Complaint pointed to the large stock price decline on February 7, 2017, whether such a decline would elicit a statistically significant reaction in the Notes' price requires a full reading of the news. Even if the Complaint had mentioned the FXCM Notes' price reaction – which it did not – it is entirely possible that news which affects an entire industry sector would simultaneously cause a large price reaction in all securities within that industry sector. After factoring out the sector effect of such news, the price response of the security in question will appear non-statistically significant. Such a possibility refutes Dr. Hendershott's implication that I knew that the February 7, 2017 event would elicit a statistically significant price reaction even prior to performing an event study.

⁹¹ Hendershott Report, ¶75.

⁹² Hendershott Report, ¶74.

iii. My Event Study Demonstrates That The FXCM Notes Reacted to Allegation-Related Information

57. Dr. Hendershott argues that my event study for the FXCM Notes “does not provide reliable evidence as to whether any alleged misrepresentations would have been incorporated into the price of the FXCM Notes throughout the Putative Notes Class Period.”⁹³ Dr. Hendershott suggests that I should have instead examined “the price movements associated with the 21 alleged misstatements identified in the Complaint.”⁹⁴ Dr. Hendershott fails to appreciate that misstatements do not typically cause security price movements. As explained in the Werner Report:

Not every piece of new information will result in a statistically significant abnormal stock return. To the extent that the new information may have been expected, or the valuation impact of the new information is appropriately modest, the appropriate abnormal price return would not be statistically significant. As such, a finding of non-significance does not necessarily establish inefficiency, as a modest non-significant stock price reaction may be the appropriate and efficient stock price reaction to a particular information event.⁹⁵

58. To conclude that FXCM Notes were not efficient with respect to allegation-related information simply because the Notes’ prices did not respond to misstatements is an example of the evidence of absence fallacy. Failing to prove a proposition does not disprove the proposition or prove the opposite of the proposition to be true. Basic statistics textbooks explain the principle.

We should emphasize that if the null hypothesis [H0] is not rejected, based on the sample data, we cannot say that the null hypothesis is true. To put it another way, failing to reject the null hypothesis does not prove that H0 is true, it means we have *failed to disprove H0*.⁹⁶

59. Further, a material misrepresentation or omission may have price impact without eliciting a statistically significant price increase. A nonsignificant price movement does not prove that

⁹³ Hendershott Report, ¶76.

⁹⁴ Hendershott Report, ¶77.

⁹⁵ Werner Report, ¶53.

⁹⁶ “Statistical Techniques in Business and Economics,” by Robert D. Mason, et al., 10th Edition, Irwin McGraw-Hill, 1999, p. 307 (emphasis in original).

there was no price impact. When misleading statements or omissions maintain prior expectations and conceal adverse developments, they will generally maintain the prior price level, prevent a price decline, and thereby cause the price to be at a level other than what the price would have been but for the misrepresentations and omissions. This is price impact without price movement. This effect is known as the maintenance principle. It is generally accepted and described in the forensic finance literature:

Statements that allegedly inflated the share price often do not result in an observed price increase when they were made. For example, one might not expect large increases in share prices for a firm that inflated its stock price by falsely reporting high earnings, if it consistently met market expectations.⁹⁷

60. Because of the nature of misstatements to simply maintain false representations or omit material information from market participants, corrective disclosures are generally better candidates for determining whether allegation-related information had price impact – or, if a company’s security price was efficient with respect to such allegation-related information – as corrective disclosures typically mark a shift in the mix of information available to investors. Therefore, my event study’s finding of a statistically significant price reaction to the alleged corrective disclosure on February 7, 2017 does demonstrate that FXCM Notes traded in an efficient market with respect to allegation-related information.

iv. A News vs. No-News Collective Test is Inappropriate For FXCM Notes

61. Dr. Hendershott raises the concern that my “methodology for assessing *Cammer* Factor No. 5 differs for FXCM’s common stock and the FXCM Notes.”⁹⁸ Specifically, Dr. Hendershott argues that I should have also performed a news vs. no-news test for the FXCM Notes which would purportedly “provide[] evidence inconsistent with [my] conclusion of the FXCM Notes trading in an efficient market.”⁹⁹ However, Dr. Hendershott’s suggestion that a news vs no-news collective test should also be performed for the FXCM Notes is based on the

⁹⁷ “Federal Securities Acts and Areas of Expert Analysis,” by Nicholas I. Crew, et al., in Chapter 18 of the *Litigation Services Handbook; The Role of the Financial Expert*, 4th ed., edited by Roman L. Weil, et al., John Wiley & Sons, Inc., 2007, pp. 18.14-15.

⁹⁸ Hendershott Report, ¶79.

⁹⁹ Hendershott Report, ¶82.

erroneous assumption that FXCM Notes would react to the 8-K filings in the same way as FXCM common stock. Due to this erroneous foundational assumption, Dr. Hendershott's assertion that such a collective test would provide evidence inconsistent with market efficiency is false.

62. Contrary to Dr. Hendershott's representation that I did "not explain in [my] report why it was appropriate to conduct a 'news no-news' test for the common stock but not for the FXCM Notes," I did provide such reasoning in the Werner Report.

Because of bonds' seniority in the capital structure of a company, bonds' values and therefore prices are insulated from all but the most extreme news by a common stock valuation cushion. As a result, bonds are typically the least sensitive of all securities to company-specific news while being the most sensitive to a change in a firm's probability of default. It follows that not all of the event study events selected for FXCM common stock would make suitable candidates for a bond market efficiency event study.¹⁰⁰

63. Because of their senior status, bond values are substantially insulated from all but the most extreme news by a valuation cushion provided by the common stock. As a result, bonds are the least sensitive of all securities to firm specific news while being the most sensitive to a change in a firm's probability of default.¹⁰¹ The literature is also clear that unless bonds already have high default probability, they are insensitive to general events such as earnings announcements (which were included in the "news" days tested for FXCM common stock).

[T]he coefficient relating annual bond returns and the change in annual earnings (the annual analysts' forecast error) is larger for bonds that are rated speculative grade. We find no connection between the annual returns on low-risk bonds and the annual change in earnings.¹⁰²

64. For these reasons, a general collective test, such as the news vs. non-news test that I performed on 8-K events for the common stock would not be appropriate for debt securities. Further, consistent with economic and financial principles, collective tests are highly

¹⁰⁰ Werner Report, ¶137.

¹⁰¹ See, e.g., "Understanding the Efficiency of the Market for Preferred Stock," by Michael Hartzmark and H. Nejat Seyhun, *Virginia Law and Business Review*, Spring 2014, pp. 9-10.

¹⁰² "Initial Evidence on the Role of Accounting Earnings in the Bond Market," by Peter Easton, et al., *Journal of Accounting*, Vol. 47, No. 3, June 3, 2009, p. 723.

unlikely to result in a statistically significant outcome for debt securities, a lack of statistical significance demonstrates only that the FXCM Notes were behaving as bonds should in an efficient market – it is not evidence “inconsistent with market efficiency.”

v. My Regression Methodology For The FXCM Notes Was Appropriate

65. In Appendix C of the Hendershott Report, Dr. Hendershott contends that the event study I performed for the FXCM Notes suffers from five flaws: i) by using multi-day returns to measure the price reaction of FXCM Notes to the two event study events that I studied, I have “no basis to conclude that this return measures the impact only of the alleged disclosure on February 6, 2017, rather than information that was released prior to this date”;¹⁰³ ii) I “erroneously use[d] daily standard errors to calculate the t-statistics for a two-day return on January 16, 2015”;¹⁰⁴ iii) I should have considered sub-periods for my regression estimation window, similar to my methodology for FXCM common stock;¹⁰⁵ iv) I underestimated the typical volatility in FXCM Notes’ returns because I “inappropriately” dummed out the Company’s 8-K announcements;¹⁰⁶ and v) “Dr. Werner’s choice of an equity market and peer index as the explanatory factors for the FXCM Notes returns is not supported by the academic literature.”¹⁰⁷ I address each of Dr. Hendershott’s arguments in detail below.
66. As an initial matter, Dr. Hendershott fails to specify if any of the critiques that he has identified has any bearing on the statistical significance of the event study events that I tested for the FXCM Notes. That is, Dr. Hendershott has failed to offer any statistical evidence to contradict my finding that the FXCM Notes reacted to Company-specific information on January 16, 2015 and February 7, 2017. Absent such evidence, Dr. Hendershott’s contentions amount to little and cannot disprove that the FXCM Notes reacted to Company-specific information, which is indicative of an efficient market.

¹⁰³ Hendershott Report, Appendix C, ¶5.

¹⁰⁴ Hendershott Report, Appendix C, ¶7.

¹⁰⁵ Hendershott Report, Appendix C, ¶¶8-10.

¹⁰⁶ Hendershott Report, Appendix C, ¶11-12.

¹⁰⁷ Hendershott Report, Appendix C, ¶14.

a) The Use of Multi-Day Returns Is a Non-Issue As Dr. Hendershott Has Not Identified Any News That Could Have Affected FXCM Notes' Price Other Than The Selected Event

67. Dr. Hendershott opines that I have no basis to conclude that the return I calculated for the February 7, 2017 “measures the impact only of the alleged disclosure on February 6, 2017, rather than information that was released prior to this date” because I had used an 11-day return since the FXCM Notes had not traded since January 26, 2015.¹⁰⁸
68. Despite Dr. Hendershott’s critique that I may have measured the impact of non-allegation related information, he has failed to identify any such information nor am I aware of any other Company-specific information that was released between January 26, 2015 to February 6, 2017. As such, Dr. Hendershott has no basis to assert that the return I calculated for the February 7, 2017 event reflected anything other than the information at issue.
69. While Dr. Hendershott notes that “the FXCM common stock declined by 5.52% between January 26 and February 6,”¹⁰⁹ he fails to mention that the FXCM common stock did not experience a single statistically significant return during that time. Therefore, the only reliable conclusion that can be drawn for this period is that random volatility caused the FXCM common stock to decline by 5.52%, rather than Company-specific information. The fact that the February 7, 2017 still elicited a statistically significant price reaction in the FXCM Notes despite incorporating this additional volatility is further evidence that the February 7, 2017 was an extreme event for the FXCM Notes and proves that the FXCM Notes reacted to Company-specific information.

b) The Use of Daily Standard Errors To Estimate The Statistical Significance of Residual Returns on Event Dates Is Appropriate

70. Dr. Hendershott states that, “when calculating the t-statistic to determine whether the abnormal returns are significant, Dr. Werner uses the standard errors (a volatility measure) obtained from a regression that uses daily returns and therefore, a measure of daily volatility. Dr. Werner erroneously uses these daily standard errors to calculate the t-statistics for a two-

¹⁰⁸ Hendershott Report, Appendix C, ¶5.

¹⁰⁹ Hendershott Report, Appendix C, ¶5.

day return on January 16, 2015 and an 11-day return on the disclosure day. Therefore, the t-statistics for multiday returns on January 16, 2015 and the alleged corrective disclosure day have been substantially overestimated.”¹¹⁰ Dr. Hendershott overlooks the fact that the returns in question are not a two-day return or an 11-day return, but rather returns over consecutive trading periods. Thus, each of these returns can be considered a single period return, and a single period standard error is the appropriate measure to judge each return’s statistical significance. It would be erroneous to use, say, an 11-period standard error to estimate the t-statistic of a single period return.

c) Sub-Periods Are Unnecessary for the FXCM Notes Given When It Traded

71. Dr. Hendershott argues that I was “inconsistent in [my] choice of estimation window for the FXCM stock versus the Notes” and suggests that I should have also considered subperiods for the FXCM Notes regression since I used subperiods for the FXCM common stock.¹¹¹ For the FXCM common stock, I ran regressions on daily returns covering the entire Class Period broken down into 252 day periods.¹¹² This methodology would not have been feasible for the FXCM Notes given frequency of trading. While the FXCM common stock traded every day and therefore had enough observations for year-long regressions, the FXCM Notes had only enough trading to provide 66 return observations for the entire Notes Period. Dr. Hendershott’s critique fails to recognize that any reduction to this already low number of observations would lower the power of the regression due to sample size issues. Further, Dr. Hendershott fails to establish that my regression for the FXCM Notes suffers from any statistical flaws, such as a structural break. Simply comparing the coefficients of the ***FXCM Common Stock Regressions*** that I performed is not indicative of any structural changes in the regression dynamics for the FXCM Notes.

¹¹⁰ Hendershott Report, Appendix C, ¶7.

¹¹¹ Hendershott Report, Appendix C, ¶8-10.

¹¹² Werner Report, ¶76.

***d) My Use of Dummy Variables Was Appropriate and
The Results of My Event Study for the FXCM Notes Are
Robust To Their Exclusion***

72. Dr. Hendershott contends that I do “not provide a reliable basis for excluding trading data from [my] event study” using dummy variables.¹¹³ Dr. Hendershott is wrong, I did provide such a basis. For example:

As the purpose of the event study regression is to measure the normal stock price dynamics over typical days, it is appropriate to control for the unusual behavior of the FXCM common stock price with dummy variables. As noted in the academic and finance literature, using indicator variables to control for potentially atypical observations in the estimation period so that the model parameters properly reflect typical stock price dynamics, is a generally accepted methodology.¹¹⁴

73. In addition to support from academic literature as documented in my earlier report, there is also precedent in caselaw for similar use of dummy variables.¹¹⁵ Further, Dr. Hendershott himself provides the basis for using dummy variables as he admits that “one purpose of an event study is to estimate ‘normal’ volatility.”¹¹⁶ Since news events are atypical days, their exclusion from a regression estimation period models “normal” volatility, while their inclusion would pollute the measure of “normal” volatility with atypical and non-normal returns.
74. Regardless, Dr. Hendershott has failed to demonstrate that my inclusion of dummy variables has any effect on the conclusions that I drew from my event study. That is, there is no evidence that the inclusion or exclusion of dummy variables for the FXCM Notes has any effect on the statistical significance of the events that I tested.

¹¹³ Hendershott Report, Appendix C, Section D.

¹¹⁴ Werner Report, ¶77.

¹¹⁵ In *re Groupon Sec. Litig.*, 2015 WL 1043321 (N.D. Ill. Mar. 5, 2015) the Court accepted the use of 5 dummy variables over a 1-year class period. In *Bricklayers and Trowel Trades Intern. Pension Fund v. Credit Suisse Securities (USA) LLC*, 752 F.3d 82 (1st Cir. 2014) the Court noted that the use of 211 dummy variables over 388 dates does not alone negate the reliability of the study.

¹¹⁶ Hendershott Report, Appendix C, ¶12.

e) Dr. Hendershott Fails To Provide Any Alternative Regression Model for Assessing the Efficiency of the Market for FXCM Notes

75. Dr. Hendershott’s final critique of my empirical analysis for the FXCM Notes is that my “choice of an equity market and peer index as the explanatory factors for the FXCM Notes returns is not supported by the academic literature” and that I should have also included a “bond market related” factor in my regression.¹¹⁷ Despite his accusations, Dr. Hendershott has failed to identify even a single example of an additional explanatory factor that I should have included. In fact, Dr. Hendershott never performs an event study of his own that contradicts or otherwise disproves my finding of market efficiency. Absent any analysis of his own, Dr. Hendershott has no basis to conclude that my market model for the FXCM Notes was “ill-specified” as he has offered no example of what his version of a properly specified model would be.¹¹⁸

D. Dr. Hendershott’s Criticisms of My Proposed Damages Methodology are Misguided and Premature

76. In the Werner Report, I was asked to describe how a common damages methodology, consistent with the Plaintiffs’ theory of liability, can be applied to compute damages for all investors who purchased FXCM securities during the Class Period. I concluded that damages could be computed on a class-wide basis for each of the FXCM securities and for all Class Members using a common methodology that is consistent with the Plaintiffs’ allegations of liability.
77. As I explained in my report, the first step to calculate damages would be to determine whether the disclosure(s) caused the prices of the FXCM securities to fall significantly. Event study results and valuation tools would be applied to determine the magnitude of the price decline attributable to the corrective disclosures. I further explained that inflation ribbons would be constructed, using generally accepted empirical analyses and valuation tools, to indicate how much artificial inflation caused by the alleged misrepresentations and omissions was in the prices of the FXCM securities on each day during the Class Period.

¹¹⁷ Hendershott Report, Appendix C, ¶14.

¹¹⁸ Hendershott Report, Appendix C, ¶16.

78. Dr. Hendershott claims that the common damages methodology that I proposed in the Werner Report will not be “capable of measuring price inflation attributable only to the allegedly misrepresented or omitted information given the specific facts and circumstances of the case.”¹¹⁹ Dr. Hendershott raises four specific issues that he contends that the proposed common damages methodology may not be able to handle: i) “Dr. Werner’s methodology needs to be capable of disentangling the impact of multiple pieces of information in order to measure inflation”;¹²⁰ ii) “it is not clear that the allegedly corrective information, absent the collateral consequences, would be value relevant to investors”;¹²¹ iii) “Dr. Werner has not demonstrated that an event study based on the FXCM security price movements on February 7, 2017 could provide a reliable measure of the value impact of information revealed on that day”;¹²² and iv) “Dr. Werner’s proposed methodology fails to account for potential changing inflation across the putative class period.”¹²³
79. Dr. Hendershott’s criticisms relate to a hypothetical implementation of my proposed damages methodology, and not to the methodology or the appropriateness of the model itself. Each of the valuation complexities that Dr. Hendershott raises are appropriately addressed in an analysis of loss causation and damages, and none are insurmountable. Consequently, the Hendershott Report gives me no reason to revise my conclusion that a common methodology exists to calculate damages for Class Members.

i. Dr. Hendershott’s Challenges to my Damages Methodology Concern Potential Valuation Complexities, Which Can and Will be Addressed in an Analysis of Loss Causation

80. Dr. Hendershott does not dispute that a common methodology exists that can measure damages class-wide for the FXCM securities. Further, Dr. Hendershott does not dispute that event study results and valuation tools can be used to construct an inflation ribbon, or that an inflation ribbon can serve as the basis of a damages methodology, such that per-share damages would take into account the change in artificial inflation over each investor’s

¹¹⁹ Hendershott Report, ¶95.

¹²⁰ Hendershott Report, Section V.A.1.

¹²¹ Hendershott Report, Section V.A.2.

¹²² Hendershott Report, Section V.B.

¹²³ Hendershott Report, Section V.C.

holding period. Rather, Dr. Hendershott's concern with my damages methodology is that valuation complexities *may* arise during the process of constructing an inflation ribbon, and that I have not explicitly stated *how* I would deal with every single potential complexity that *may or may not* arise. Dr. Hendershott states:

Section V addresses Plaintiffs' claim that damages for class-wide claims related to FXCM common stock and the FXCM Notes can be readily calculated using an "event study methodology." However, Dr. Werner fails to show that the generic damages approach described in his report, including his generic reference to an event study, could be used to calculate damages in a manner consistent with Plaintiffs' theory of liability.¹²⁴

Specifically, information about regulatory ramifications and other collateral consequences that arose from the alleged corrective disclosure (e.g., FXCM's immediate exit of its U.S. business) was also released on February 6, 2017. From an economics perspective, the price impact of such collateral consequences may not reflect the removal of alleged price inflation (i.e., how price during the Putative Class Period would have changed had investors known about the alleged business arrangements with Effex that discontinued in 2014), and one cannot simply rely on an event study, such as the one employed by Dr. Werner, to disentangle the impact of such information. Dr. Werner fails to explain how the generic damages approach he advocates can be used to measure price inflation attributable to the alleged misrepresentations and omissions rather than the impact of collateral consequences.¹²⁵

Dr. Werner does not address whether the markets for FXCM's common stock and the FXCM Notes were efficient in such a way that the residual returns from an event study on the alleged corrective disclosure date can be used to reliably measure inflation. This is particularly relevant for the FXCM Notes given, as discussed above in Section IV, Dr. Werner's market efficiency analysis for the FXCM Notes is flawed, deficient, and biased.¹²⁶

¹²⁴ Hendershott Report, ¶14.

¹²⁵ Hendershott Report, ¶15.

¹²⁶ Hendershott Report, ¶109.

Dr. Werner does not indicate how such a methodology could disentangle any price impact of “collateral consequences” that were revealed on February 6, 2017 (i.e., FXCM’s immediate exit of its U.S. business) from price inflation that could be attributed to the alleged misrepresentations and omissions. ... Finally, Dr. Werner does not provide any explanation regarding how his ‘back-casting’ methodology can be used to measure inflation given the likely time varying nature of the alleged fraud and changes in FXCM’s financial situation.¹²⁷

In this section I discuss that given the fact pattern in this case Dr. Werner needs to propose a methodology that is capable of disentangling the price impact of multiple pieces of information that were disclosed simultaneously on the alleged corrective disclosure day, which is something an event study as employed by Dr. Werner cannot always do. I also discuss that it is not clear that the alleged corrective information alone, absent the “collateral consequences” that were disclosed contemporaneously, would have been value-relevant to investors as of February 7, 2017. This means ‘back-casting’ the residual price decline following the alleged corrective.¹²⁸

Even assuming prices were inflated, Dr. Werner does not demonstrate how a damages methodology based on an event study would be able to account for the likely changes in inflation during the Putative Class Period.¹²⁹

81. Dr. Hendershott argues that my damages methodology is inadequate because I have not concretely stated with precision how I would address every potential valuation complexity that could arise in the process of constructing an inflation ribbon. If it is Dr. Hendershott’s contention that an inflation ribbon needs to be constructed prior to class certification, then he is wrong. The construction of an inflation ribbon, and any subsequent adjustments necessary for case-specific valuation complexities, are properly addressed in an analysis of loss causation, which I have not yet been asked to perform. Consequently, Dr. Hendershott’s contention that each of these potential valuation issues must be accounted for at the current stage of this litigation is moot.
82. If I am asked to perform a loss causation analysis, I will take special care to ensure that an inflation ribbon is constructed such that it properly controls for potential valuation

¹²⁷ Hendershott Report, ¶98.

¹²⁸ Hendershott Report, ¶99.

¹²⁹ Hendershott Report, ¶112.

complexities. Further, Dr. Hendershott's concerns regarding adjustments to the inflation ribbon for purported valuation complexities is an implicit concession that such an inflation ribbon can be constructed and can be applied to compute damages in the current case.

***ii. The Common Damages Methodology Handles All
Purported Valuation Complexities Raised by Dr. Hendershott***

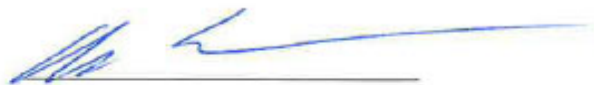
83. Dr. Hendershott's criticisms are directed at a hypothetical inflation ribbon that I have not yet constructed. He is essentially arguing that the damages model must be flawed simply because it *may be* executed incorrectly. Dr. Hendershott's critique is not a condemnation of the damages model, but rather a caution that it should be implemented carefully and correctly. Moreover, Dr. Hendershott has no basis at this juncture, without full development of the record and without conducting any empirical analysis, to determine what may or may not be confounding information. The opinion he offers now is purely speculative and therefore unreliable.
84. The careful and correct implementation of the inflation ribbon and damages model utilizes valuation tools routinely used for virtually every publicly traded security. The analysis aims to ascertain the price at which informed market participants would trade any particular security. In an efficient market, traders and investors update their valuations continuously to reflect changes in information and forensic analysts seek to replicate market participants' valuations.
85. The forensic analyst has at their employ a variety of valuation tools designed to accommodate the potential valuation complexities identified by Dr. Hendershott. Among the commonly used valuation tools that are available are valuation multiple models, such as those based on earnings, EBITDA, revenue, book value, and cash flow; discounted cash flow models (DCF); return attribution analysis; and the literature regarding valuation effects of factors such as reputation and quality of accounting. In addition, forensic analysts have the added benefit of event study analysis. The valuation analysis necessary to compute inflation and damages is clearly feasible and routinely implemented in securities litigation.
86. The construction of the inflation ribbon is an application of standard valuation analysis. If asked by Counsel, I will construct, carefully and correctly, an inflation ribbon that will serve as the basis of per-share damages calculations for the FXCM securities. The Hendershott Report provides me no reason to revise my conclusion that a common damages

methodology, consistent with Plaintiffs' theory of liability, can be applied to compute damages for all investors who purchased FXCM securities during the Class Period.

IV. LIMITING FACTORS AND OTHER ASSUMPTIONS

87. My analyses and opinions are based on the information available as of the date of this report. Should any additional data or information become available subsequent to the submission of this report, I reserve the right to supplement or amend this report.

Dated: July 27, 2020



Adam Werner, PhD
Affiliated Expert,
Crowninshield Financial Research

Exhibit-1
Curriculum Vitae
Adam Werner, Ph.D.

EDUCATION

| | |
|------|--|
| 1998 | Northwestern University, Kellogg Graduate School of Management Ph.D. in Finance |
| 1992 | Oberlin College B.A. in Economics |

TEACHING EXPERIENCE

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| 2014 – Present | Cal Poly San Luis Obispo Orfalea College of Business San Luis Obispo, CA Lecturer in Economics |
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BUSINESS EXPERIENCE

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| 2018 – Present | Pismo Beach Planning Commission |
| 2015 – Present | Crowninshield Financial Research |
| 2009 – 2015 | Gnarus Advisors/Berkeley Economic Consulting |
| 2008 – 2009 | LitiNomics |
| 2004 – 2008 | CRA International |
| 2000 – 2003 | National Economic Research Associates, Inc. |
| 1998 – 2000 | Cornerstone Research |
| 1992 – 1993 | Federal Reserve Bank |

PAPERS AND PUBLICATIONS

“The Impact of Underwriter Reputation on Equity Offering: An Empirical Study.”
Thesis, 1999.

“The Long-Run Performance of Underwriters and its Impact on Seasoned Equity Offerings.” 1999.

“Dynamic Measures of Underwriter Reputation: A Study of IPO’s.” 1999.

“CAFE Economics: A Note on the Limits and Effectiveness of Fuel Economy Regulation.” With Stephen Sheppard, 1992.

“Trading Models Underestimate Securities Class Damages.” with Narinder Walia, Law360, 2019.

“More ‘Dark Pools’ Deepen Litigation Issues.” Law360, 2013.

“Recent Trends in Securities Class Action Litigation: Will Enron and Sarbanes-Oxley Change the Tides.” with Elaine Buckberg, Todd Foster and Ronald Miller, 2003.

“The Effects of the PSLRA and Subsequent Events on Securities Litigation.” With Fred Dunbar and Todd Foster, prepared for the New York City Bar Association, 2003.

“The Energy Tax: Who Pays?” joint with Mark Schweitzer, in Federal Reserve Bank of Cleveland’s Economic Commentary, 1993.

PRESENTATIONS

“Cause or Effect: Are Settlement Statistics Driving Down Settlements?” Presentation to Robbins Geller Rudman & Dowd, LLP in San Diego, CA on October 10, 2013, Wolf Popper, LLP in New York, NY on September 18, 2013, Abraham, Fruchter & Twersky, LLP in New York, NY on September 17, 2013, Robbins Geller Rudman & Dowd, LLP in Melville, NY on September 11, 2013, Entwistle & Cappucci, LLP in New York, NY on September 10, 2013, and Faruqi & Faruqi, LLP in New York, NY on September 10, 2013.

“The Economics of Securities Litigation.” Sidley & Austin in Los Angeles, CA on March 14, 2007.

“The Global Cost of Capital.” Panel discussion on valuing assets in foreign countries at the University of Texas School of Law VALCON conference in Las Vegas on February 8, 2007.

“Economic Damages in Securities Fraud Matters.” NERA Luncheon Seminars with Alan Cox given at the Fifth Avenue Suites Hotel in Portland, OR on November 19, 2002 and at the W Hotel in Seattle, WA on November 20, 2002.

“Shareholder Class Actions: Calculation of Damages.” Presentation to Skadden, Arps, Slate, Meagher & Flom, LLP in San Francisco, CA on October 30, 2002, Marsh FINPRO in San Francisco, CA on September 18, 2002, Marsh Risk & Insurance Services in San Diego, CA on September 17, 2002 and Marsh FINPRO in Los Angeles, CA on September 13, 2002.

“Capital Formation: Class Action Litigation and Prevention.” Speech and panel discussion focusing on securities class action litigation, which sometimes arise from

initial public offerings and/or market volatility in the aftermarket. Presented at the 2002 CALBIO Summit in San Diego, CA on April 23, 2002.

“Shareholder Class Actions after the NASDAQ Bubble.” Speech given to the Securities Litigation Sub-Committee of the Colorado Bar Association at Holland & Hart, LLP in Denver, CO on April 17, 2002.

“Trends in Litigation: How Claims and Losses Are Valued.” Speech at the American Bankers Association Insurance Risk Management Annual Conference in San Diego, CA on February 4, 2002.

“Recent Trends in Securities Litigation.” “Basic Economic Analysis in Securities Class Action” and “Challenging the Efficient Market Assumption in Securities Class Action Matters.” presented to Cooley Godward in San Diego, CA on November 28, 2001. “Recent Trends in Securities Litigation.” presentation with Marcia Mayer given at Howard, Rice, Nemerovski, Canady, Falk & Rabkin in San Francisco, CA on November 27, 2001.

“Recent Trends in Securities Litigation.” presentation given to Marsh USA in Denver, CO on November 8, 2001, and Thelen, Reid & Priest in Los Angeles, CA on November 6, 2001.

“Financial Economics in Litigation.” speech presented to Simpson, Thacher & Bartlett in Palo Alto, CA on July 31, 2001, Baker & McKenzie in San Diego, CA on July 18, 2001, Brobeck, Phleger & Harrison in San Francisco, CA on June 25, 2001 and to Latham & Watkins in San Francisco, CA on June 26, 2001.

“Economic Analysis in Securities Fraud Cases.” Speech with Alan Cox delivered to Morrison & Forester, San Francisco, CA on July 25, 2001.

“Recent Trends: Shareholder Class Actions Five Years After the PSLRA.” speech presented to Shearman & Sterling in San Francisco, CA on May 23, 2001, O’Melveny & Myers in Los Angeles, CA on May 30, 2001 and Gray, Cary, Ware & Freidenrich in San Diego, CA on June 6, 2001.

EXPERT REPORTS AND TESTIMONY

In re Horsehead Holding Corp. Securities Litigation. Issues a report (2020) and provided deposition testimony (2020) on market efficiency in a securities class action (U.S.D.C. District of Delaware)

In re Global Brokerage, Inc. f/k/a/ FXCM Inc. Issued a report (2020) and provided deposition testimony (2020) on market efficiency in a securities class action (U.S.D.C. Southern District of New York)

Bing Li, et al. v. Aeterna Zentaris, Inc., et al. Issued a declaration (2016), a report (2017), and provided deposition testimony (2017) on market efficiency in a securities class action. Issued a declaration (2019) a reply report (2019), and provided deposition testimony (2020) on loss causation and damages (U.S.D.C. District of New Jersey).

In re Patriot National Inc. Securities Litigation. Issued a declaration (2019) and a supplemental declaration (2019) on damages in a securities class action (U.S.D.C. Southern District of New York).

Hamza Ramzan, et al. v. GDS Holdings Limited, et al. Issued a declaration on NASDAQ microstructure in a securities class action (U.S.D.C. Eastern District of Texas, Marshall Division, 2019).

Ivan Nibur, et al. v. SandRidge Mississippian Trust I, et al. Issued a declaration (2018), a reply declaration (2018), a supplemental reply declaration (2018), and provided deposition testimony (2018) on market efficiency in a securities class action. Issued a declaration (2019) a rebuttal declaration (2019), and provided deposition testimony (2019) on loss causation and damages (U.S.D.C. Western District of Oklahoma).

In Re Insys Therapeutics, Inc. Securities Litigation. Issued a report on market efficiency in a securities class action (U.S.D.C. Southern District of New York, 2019).

In Re Spectrum Pharmaceuticals, Inc. Securities Litigation. Issued a declaration (2019) and provided deposition testimony (2019) on market efficiency in a securities class action (U.S.D.C. District of Nevada).

Amanda Beezley et al. v. Fenix Parts, Inc., et al. Issued a declaration on market efficiency in a securities class action (U.S.D.C. Northern District of Illinois, Eastern Division, 2019).

Michael Desta, et al. v. Volkswagen Aktiengesellschaft, et al. Issued a declaration regarding benefits to firms that have ADRs outstanding in a securities class action (U.S.D.C. Eastern District of New York, 2018).

Michael Desta, et al. v. Wins Finance Holdings Inc., et al. Issued a declaration (2018) and provided deposition testimony (2018) on market efficiency in a securities class action (U.S.D.C. Central District of California).

Andrew Meyer, et al. v. Concordia International Corp., et al. Issued a declaration (2018), a reply declaration (2018), and provided deposition testimony (2018) on market efficiency in a securities class action. Issued a declaration (2018), a reply declaration (2018), and provided deposition testimony (2018) on loss causation and damages (U.S.D.C. Southern District of New York).

In re: K12 Securities Litigation. Issued a declaration (2018) and provided deposition testimony (2018) on market efficiency in a securities class action (U.S.D.C. Northern District of California).

Robert Colman, et al. v. Theranos, Inc., et al. Issued a declaration on damage methodology and price impact in a securities class action (U.S.D.C. Northern District of California, San Jose Division, 2018).

In re: CytRx Corporation Securities Litigation. Issued a declaration (2017) and provided deposition testimony (2018) regarding market efficiency in a securities class action (U.S.D.C. Central District of California).

Lord Abbett Affiliated Fund, Inc., et al. v. American International Group, Inc. Issued a report regarding market efficiency, loss causation, and damages in a securities case (U.S.D.C. Southern District of New York, 2017).

Xiaolin Chi, et al. v. Qiao Xing Universal Resources, Inc., et al. Issued a report on damages in a securities class action (District Court of the Virgin Islands, St. Croix Division, 2017).

John Hosey v. Twitter, Inc., et al. Issued a declaration (2017) and provided deposition testimony (2017) regarding rebuttal to Defendants' Motion for Summary Judgement in a securities class action (Superior Court of the State of California, County of San Mateo).

Gwyn R. Hartman Revocable Living Trust v. Southern Michigan Bancorp, Inc. et al. Issued a report on damages arising from alleged exclusions in a proxy solicitation (U.S.D.C. Western District of Michigan, 2017).

Fred Kelsey, et al. v. Textura Corporation, et al. Issued a declaration (2017) and provided deposition testimony (2017) on market efficiency in a securities class action (U.S.D.C. Northern District of Illinois).

Dave Carlton, et al. v. Fred Cannon. Issued a declaration on market efficiency in a securities class action (U.S.D.C. Southern District of Texas, Houston Division, 2016).

James Middlemiss v. Penn West Petroleum LTD., et al. Issued a report on damages in a securities class action (Superior Court of Justice Ontario, Canada, 2016).

David Loritz, et al. v. Exide Technologies, et al. Issued a report on damages and loss causation in a securities class action (U.S.D.C. Central District of California, 2015).

Manishkumar Khunt, et al. v. Alibaba Group Holding Limited, et al. Issued a declaration on potential investor damages in a securities class action (U.S.D.C. Southern District of New York, 2015).

Biotechnology Value Fund, L.P. et al. v. Celera Corporation et al. Issued a report (2014), a reply report (2014), a supplemental report (2014), and provided deposition testimony (2014) on damages arising from a merger (U.S.D.C. Northern District of California).

In re: Hi-Crush Partners L.P. Securities Litigation. Issued a declaration (2014), a supplemental declaration (2014), and provided deposition testimony (2014) regarding market efficiency in a securities class action (U.S.D.C. Southern District of New York).

Ian Mausner v. MarketByte LLC, et al. Issued a declaration about investment advisor incentives and liquidity needs in a securities class action (U.S.D.C. Southern District of California, 2014).

Artes Medical, Inc. v. Lemperle et al. Provided deposition testimony on behalf of defendants about alleged damages caused by a proxy contest (Superior Court of the State of California, County of San Diego, Central District, 2013).

In re: Ebix Inc. Securities Litigation. Issued a declaration (2012) and provided deposition testimony (2013) regarding market efficiency in a securities class action (U.S.D.C. Northern District of Georgia, Atlanta Division).

Erik Poole and William Rhody v. Alange Energy Corp., et al. Issued a report (2012) and a reply report (2013) on market efficiency and damages in a securities class action (Superior Court of Justice Ontario, Canada).

In re: Hecla Mining Securities Litigation. Issued a declaration on investor losses in a securities class action (U.S.D.C. District of Idaho, 2012).

Mark Henning, Roman Zaretski and Chrisitan Stillmark v. Orient Paper, Inc. et al. Issued a declaration (2011), a supplemental declaration (2012) and provided deposition testimony (2012) regarding market efficiency in a securities class action (U.S.D.C. Central District of California).

Carlos Munoz et al. v. China Expert Technology, Inc., et al. Issued a declaration (2012), a supplemental declaration (2012) and provided deposition testimony (2012) in a securities class action regarding market efficiency (U.S.D.C. Southern District of New York).

Theodore Dean, et al. v. China Agritech, Inc., et al. Issued a declaration (2012), a supplemental declaration (2012) and provided deposition testimony (2012) in a case regarding market efficiency in a securities class action (U.S.D.C. Central District of California).

Robert Michael Shenk, Derivatively on Behalf of Sirius XM Radio Inc. v. Melvin Alan Karmazin, et al. Issued an expert report (2011), a supplemental expert report (2012) and provided deposition testimony (2012) in a case involving damages in a shareholder derivative matter (U.S.D.C. Southern District of New York).

Pathway Investments Pty Ltd and Doystoy Pty Ltd v. National Australia Bank Ltd.

Submitted a report on survey techniques, the efficient market hypothesis and liquidity in a securities class action (Supreme Court of Victoria at Melbourne, Australia, Commercial and Equity Division, Commercial Court, 2012).

Bruce Simmonds, Robert Grant and Gordon Moore v. Armtec Infrastructure Inc. et al.

Issued a report on market efficiency and damages in a securities class action (Superior Court of Justice Ontario, Canada, 2011).

In re: BP plc. Securities Litigation. Issued a declaration regarding damages and materiality in a securities class action (U.S.D.C. Southern District of Texas, Houston Division, 2010).

In re: Tripath Technology Inc., Debtor. Issued a report (2009) and provided deposition testimony (2010) regarding damages arising from Directors' and Officers' breach of fiduciary duty in bankruptcy court (U.S.B.C. Northern District of California, San Jose Division).

David Ainslie and Muriel Marentette v. CV Technologies et al. Issued a report estimating damages in a securities class action (Superior Court of Justice, Ontario, Canada, 2010).

Harry Stackhouse, on Behalf of Himself and All Others Similarly Situated v. Toyota Motor Corporation, et al. Issued a declaration regarding the relationship between Toyota's U.S. stock price and Japanese stock price in a securities class action (U.S.D.C. Central District of California, 2010).

Phillip Elliot and William Kormos v. NovaGold Resources Inc., et al. Issued a declaration in a securities class action regarding trading volume in the U.S. versus Canada. (Superior Court of Justice, Ontario, Canada, 2010).

International Arbitration between a private equity firm and Chinese biotech company. Issued a report (2008) and testified (2009) before an International Arbitration Committee regarding the value of a private equity investment.

Arbitration between Albert Richards and Old Republic Title Insurance. Deposed regarding estimated damages incurred by plaintiff as a result of a forced sale of Russian securities due to Old Republic's breach of contract (2008).

Californians United for a Responsible Budget, et al., v. California State Public Works Board, et al. Issued a report on the cost of issuing revenue bonds to fund California prison expansion (The Superior Court for the State of California, County of Sacramento, 2008).

Arbitration between Daniel Lyons and Morgan Lyons, and Chinese Hospital Association and Sam English. Deposed regarding plaintiffs' calculated damages arising from asbestos exposure for plaintiff (2003).

ENGAGEMENTS

Securities and Finance

In re: China Medicine Corporation Securities Litigation. Retained by class counsel to estimate damages and determine market efficiency in a securities class action.

In re: Citigroup Inc. Securities Litigation. Testified as to damages and inflation in a securities class action.

In re: Bank of America Corp. Securities, Derivative, and Employee Retirement Income Security Act (ERISA) Litigation. Retained by class counsel as damages expert in a derivative securities class action.

Government of Guam Retirement Fund et al. v Countrywide Financial Corp, et al. Retained by class counsel to estimate damages in a securities class action.

Keith Cohn v. Sanford C. Bernstein & Co., LLC and Alliance Bernstein LP. Retained by client to testify on portfolio risk in a FINRA arbitration.

In re: Semigroup Energy Partners, L.P., Securities Litigation. Retained by Plaintiffs to estimate damages in a securities class action.

Asbestos Workers Philadelphia Pension Fund v. Merix Corporation, et al. Retained by Plaintiffs to evaluate fairness of merger between Merix and Viasystems.

Retained by Goldman Sachs to provide consulting on the IPO process, the valuation of securities at IPO and the possible impact of "tie-in" agreements on the pricing of IPOs for the purpose of analyzing class certification and damages.

Joseph Phelps Vineyards, Inc., et al., v Craig Williams, et al. Retained by Joseph Phelps Vineyards to estimate the value of the winery as part of arbitration.

UnitedHealth Group Option Backdating Investigation. Retained by a Special Litigation Committee formed by UnitedHealth Group's board of directors to estimate harm caused by company's decision to backdate options.

SEC v. Henry Nicholas, et al. Retained by founder of Broadcom to estimate harm caused by company's decision to backdate options.

Enrico Bondi on behalf of Parmalat S.p.A. v. Bank of America et al. Hired by Bank of America to rebut damage arguments regarding Bank of America's role in Parmalat's eventual bankruptcy.

Capital Trading Co. v. Conor Medsystems. Retained to analyze a fairness opinion issued by Citigroup regarding the price offered by Johnson & Johnson to acquire Conor.

Enron Solvency. Retained by the surviving Enron Corporation to estimate the value of its assets for litigation purposes.

SEC v. Spear Leeds Kellogg (Goldman Sachs.) et al. Estimated damages associated with trading ahead allegations made by the SEC on behalf of Goldman market makers on the New York Stock Exchange, American Stock Exchange, Philadelphia Stock Exchange and the Chicago Board of Options Exchange.

General Fire and Casualty co. et al. v. Guy Carpenter and Co., Inc. Hired by defendant to rebut allegations that it had given incorrect advice to the plaintiff regarding reinsurance contracts.

R.D. Hubbard v. Pinnacle Entertainment, Inc. Analyzed the value of options granted and later rescinded on behalf of our client, the defendant.

Thomas Slemmer, et al. v. Cucamonga Valley Water District, et al. Estimated the value of restricted stock in a mutual water company.

Department of Labor v. Genuity (investigation). Assisted Genuity in an investigation by the Department of Labor as to whether or not Genuity stock was a safe investment for Genuity's pension fund. Investigation was dismissed.

Jason Stanley, et al. v. Safeskin Corporation, et al. Estimated damages and consulted on materiality for defendant in a securities class action.

Nanogen, Inc. v. Donald D. Montgomery and CombiMatrix Corporation. Estimated damages for defendant in cross complaint over a failed IPO resulting from plaintiff's claims of patent infringement in genomic industry.

Conseco, Inc. Securities Litigation. Retained by defendants to calculate damages in a securities class action matter.

Madison/OHI Liquidity Investors, LLC v. Omega Healthcare Investors. Estimated damages to Madison's investment funds as a result of the early termination of a debt facility.

Barbara Rosen, et al. v. Macromedia, Inc., et al. Prepared rebuttal analyses in securities class action suit on behalf of Macromedia.

Karen Yarborough v. PeopleSoft, Inc. and Does 1-20. Calculated value of stock option package in wrongful termination suit on behalf of PeopleSoft.

Michael Carabetta v. Novadigm, Inc., et al. Did analysis of damages to a former company insider on behalf of Novadigm. Estimated value of lost options and salary.

Allen T. Gilliland Trust, et al. v. H&F MobileMedia Partners, LLC, et al. Engaged by auditors to analyze plaintiffs' decision to affirm a prior transaction.

California Federal Bank v. United States. Estimated damages caused by government in breach of contract case on behalf of Cal Fed.

LaSalle Talman v. United States. Estimated damages caused by government in breach of contract case on behalf of LaSalle Talman.

Intellectual Property

Transocean v. Maersk. Retained by Maersk to defend claims of patent infringement in case involving oil drilling technology.

Abbott Laboratories, et al. v. Sandoz, Inc. Retained on behalf of Abbott to estimate patent infringement damages as a result of Sandoz's decision to introduce a generic drug prior to the expiration of a patent.

LG Phillips LCD Co., LTD v. Tatung, Chunghwa Picture Tubes, et al. Provided rebuttal analysis for defendants in a patent infringement case dealing with LCD technology.

PostX Corporation v. Secure Data in Motion, Inc. d/b/a/ Sigaba Corporation. Calculated damages arising from tortious interference and patent infringement in the secure document delivery market. Client was victorious on both complaint and cross-complaint.

Larkspur Data Resources, Inc. v. Trust Administrators, et al. Assisted plaintiff in calculating damages in trademark and copyright infringement case involving proprietary databases.

Dioptics Medical Products, Inc. v. The Cooper Companies, Inc.; CooperVision, Inc.; A. Thomas Bender; and Does 1-15. Retained by plaintiff to calculate damages in a copyright infringement case over naming of eyewear.

Intel Corporation v. Broadcom Corporation. Retained by Broadcom to estimate damages alleged by Intel based on charges of patent infringement.

Australia Vision Services Pty. Ltd. v. Dioptics Medical Products, Inc., Henry Lane, and individual, and Does 1-10. Estimated profits lost by Dioptics as a result of a competitor's allegations of patent infringement.

American Booksellers Association, Inc. v. Barnes & Noble, et al. Worked on analysis of publisher discounts and analysis of openings and closings of bookstores on behalf of Borders.

Exhibit-2
Documents Considered
In Addition to Those Cited in My January Report.

CASE DOCUMENTS

- Expert Report of Dr. Adam Werner, dated January 10, 2020.
- Expert Report of Terrence Hendershott, Ph.D., dated June 12, 2020.
- Deposition of Terrence Hendershott, Ph.D., dated July 15, 2020.

ACADEMIC AND PROFESSIONAL LITERATURE

- Crew, Nicholas I., et al., “Federal Securities Acts and Areas of Expert Analysis,” *Litigation Services Handbook*; Chapter 18, *The Role of the Financial Expert*, 4th ed., edited by Roman L. Weil, et al., John Wiley & Sons, Inc., 2007.
- Defond, Mark, and Jieyinh Zhang, “The Timeliness of the Bond Market Reaction to Bad Earnings News*,” *Contemporary Accounting Research*, Vol. 31 No. 3, 2014
- Easton, Peter, et al., “Initial Evidence on the Role of Accounting Earnings in the Bond Market,” *Journal of Accounting*, Vol. 47, No. 3, 2009.
- Fama, Eugene F., “Efficient Capital Markets: A Review of Theory and Empirical Work,” *Journal of Finance* 25 (2), 1970.
- Fabozzi, Frank, and Frederick Frank, “Bond Pricing, Yield Measures, and Total Return” Chapter 5, in *The Handbook of Fixed Income Securities*, 7th edition, edited by Frank J. Fabozzi and Steven V. Mann, McGraw-Hill, 2005.
- Hartzmark, Michael and H. Nejat Seyhun, “Understanding the Efficiency of the Market for Preferred Stock,” *Virginia Law and Business Review*, Spring 2014.
- Hotchkiss, Edith, and Tavy Ronen, “The Informational Efficiency of the Corporate Bond Market: An Intraday Analysis,” *The Review of Financial Studies*, Vol. 15, No. 5, 2002.
- Livingston, Miles, and Lei Zhou, “The Impact of Rule 144A Debt Offerings Upon Bond Yields and Underwriter Fees,” *Financial Management*, 2002.
- Mahanti, Sriketan, et al., “Latent Liquidity: A New Measure of Liquidity, With an Application To Corporate Bonds,” *Journal of Financial Economics*, 2008.
- Mason, Robert D., et al., *Statistical Techniques in Business and Economics*, 10th Edition, Irwin McGraw-Hill, 1999.
- Shleifer, Andrei, and Robert Vishny, “The Limits of Arbitrage,” *Journal of Finance* 52 (1), 1997.

Exhibit-2
Documents Considered
In Addition to Those Cited in My January Report.

OTHER

- *Bricklayers and Trowel Trades Intern. Pension Fund v. Credit Suisse Securities (USA) LLC*, 752 F.3d 82 (1st Cir. 2014)
- *In re Groupon Sec. Litig.*, 2015 WL 1043321 (N.D. Ill. Mar. 5, 2015).
- Any other documents and data cited in the report.